UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
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ART UNIT	PAPER NUMBER
2838	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/692,891	LAIG-HOERSTEBROCK ET AL.
	Examiner	Art Unit
	Aaron Piggush	2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>24 October 2003</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-25</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.·

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-3 and 7-25</u> is/are rejected.

7) ☒ Claim(s) <u>4-6</u> is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>24 October 2003</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>22 March 2004</u>.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they

include the following reference character(s) not mentioned in the description: 4a and 4b.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the

specification to add the reference character(s) in the description in compliance with 37 CFR

1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any

amended replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. Each drawing sheet

submitted after the filing date of an application must be labeled in the top margin as either

"Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not

accepted by the examiner, the applicant will be notified and informed of any required corrective

action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

3.   Claims 2, 3, 21, and 23 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. The claims are generally narrative and indefinite, failing to

conform with current U.S. practice. They appear to be a literal translation into English from a

foreign document and are replete with grammatical and idiomatic errors.

Claims 2 and 3 recite "increases more than proportionally," which is not clear since "more than proportionally" is neither described nor shown.

Claims 21 and 23 recite "behaves more than proportionally," which is not clear since "more than proportionally" is neither described nor shown.

In order to continue further prosecution, "more than proportionally" is taken to mean that the wear variables or functions are not in a linear, or constant ratio, relationship with the total number or duration of deep discharge events.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1-3, 7-9, 19, 21, 23, and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Boll (DE 195 40 827 A1).

With respect to claim 1, Boll discloses a method for determining the wear to a storage battery by monitoring the state of charge of the storage battery, the method comprising:

identifying a plurality of deep discharge events when a state of charge value for the storage battery is less than a minimum state of charge value specified for the storage battery (pg 3 ln 7-13 and pg 5 ln 5-9);

determining the duration of the plurality of deep discharge events (Fig. 3);

determining a wear variable which characterizes the wear as a function of the total

number and the total duration of the plurality of deep discharge events (pg 16 ln 3-5 and pg 14 ln

4-6 and ln 22-24);

wherein the wear variable increases as the total number and the total duration of the deep

discharge events increases (pg 16 ln 3-5).

With respect to claim 2, Boll discloses the method of claim 1 wherein the wear variable is

determined according to a function such that the wear variable increases more than

proportionally with the total number of deep discharge events (pg 13 ln 1-5 and pg 15 ln 34 to pg

16 ln 8).

With respect to claim 3, Boll discloses the method of claim 1 wherein the wear variable is

determined according to a function such that the wear variable increases more than

proportionally with the total duration of the deep discharge events (pg 13 ln 1-13 and pg 15 ln 34

to pg 16 ln 8).

With respect to claim 7, Boll discloses the method of claim 1 further comprising

determining a loss of storage capacity for the storage battery in proportion to the wear variable

on the basis of a storage capacity of the storage battery at a previous defined time (pg 3 ln 6-13

and pg 4 ln 26-31).

With respect to claim 8, Boll discloses the method of claim 7 wherein the storage

capacity of the storage battery at the previous defined time is the storage capacity of the storage

battery when the storage battery was new, and wherein the wear variable at the defined time is

set to zero (Fig. 3 and pg 13 ln 1-13).

With respect to claim 9, Boll discloses the method of claim 7 further comprising determining a first wear component that is dependent on the total number of identified deep discharge events (pg 14 ln 22-24).

With respect to claim 19, Boll discloses the method of claim 1 wherein the wear variable is determined from the sum of a first wear component that is dependent on the total number of deep discharge events and a second wear component that is dependent on the total duration of the deep discharge events (pg 15 ln 34 to pg 16 ln 8).

With respect to claim 21, Boll discloses the method of claim 19 wherein the first wear component is calculated from a first function that behaves more than proportionally to the total number of deep discharge events (pg 15 ln 34 to pg 16 ln 8).

With respect to claim 23, Boll discloses the method of claim 19 wherein the second wear component is calculated from a second function that behaves more than proportionally to the total duration of deep discharge events (pg 15 ln 34 to pg 16 ln 8).

With respect to claim 24, Boll discloses a monitoring device for storage batteries comprising:

a measurement unit for measuring variables which characterize the state of charge of the storage battery (pg 6 ln 16-24 and pg 20 ln 10-16);

an evaluation unit for determining the state of charge of the storage battery from the measured variables and for determining the wear of the storage battery using a method comprising (pg 6 ln 16-24):

identifying a plurality of deep discharge events when a state of charge value for the

storage battery is less than a minimum state of charge value specified for the storage battery (pg

3 ln 7-13 and pg 5 ln 5-9);

determining the duration of the plurality of deep discharge events (Fig. 3);

determining a wear variable which characterizes the wear as a function of the total

number and the total duration of the plurality of deep discharge events (pg 16 ln 3-5 and pg 14 ln

4-6 and ln 22-24);

wherein the wear variable increases as the total number and the total duration of the deep

discharge events increases (pg 16 ln 3-5).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

7.   Claims 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boll (DE

195 40 827 A1).

With respect to claims 10 and 12, Boll discloses the method of claim 9, as noted above

under the rejection under 35 U.S.C. 102, wherein the first wear component has a certain value

represented as a percentage of the storage capacity of the storage battery at the previous defined

time after a first deep discharge event (pg 16 ln 2-7), however, does not expressly disclose

wherein the value is between 0.1% and 50% or between 1% and 20% of the storage capacity of

the storage battery.

It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to calculate a wear component with a value between 0.1% and 50% or between 1% and 20% of the storage capacity of the storage battery by routine experimentation, in order to find a value which provides maximum efficiency and a longer life for the battery.

With respect to claims 11 and 13, Boll discloses the method of claims 10 and 12 wherein the first wear component has a certain value represented as a percentage of the storage capacity of the storage battery after the first deep discharge event at a battery temperature (pg 16 ln 2-7 and pg 24 ln 18-23), however, does not expressly disclose wherein the value is between 0.3% and 5%, or wherein the battery temperature is approximately 20°C.

It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to calculate a wear component with a value between 0.3% and 5% of the storage capacity of the storage battery at a temperature of approximately 20°C by routine experimentation, in order to find a value which provides maximum efficiency and a longer life for the battery.

With respect to claim 14, Boll discloses the method of claim 9 further comprising a wear component that is dependent on the total duration of the identified deep discharge events (pg 16 ln 3-5 and pg 14 ln 4-6 and ln 22-24 and Fig. 3).

Although Boll does not expressly disclose wherein the wear component described is a second wear component, the area of the deep discharge, which is used in the wear component

calculation, takes the duration of the deep discharge into account (Fig. 3), in order to improve the accuracy for the measurement of the discharges and the ageing of the battery.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the duration of the deep discharge events in the calculation of the wear components, so that the accuracy for the measurement of the discharges and the ageing of the battery could be improved.

With respect to claims 15 and 17, Boll discloses the method of claim 14 wherein the second wear component has a certain value represented as a percentage of the storage capacity of the storage battery at the previous defined time after a certain duration of time (pg 16 ln 2-7 and pg 13 ln 1-14), however, does not expressly disclose wherein the value is between 0.1% and 100% or between 0.1% and 20% of the storage capacity of the storage battery, or wherein the total duration of time is 100 hours.

It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to calculate a wear component with a value between 0.1% and 100% or between 0.1% and 20% of the storage capacity of the storage battery after a total duration of 100 hours by routine experimentation, in order to find a value which provides maximum efficiency and a longer life for the battery.

With respect to claims 16 and 18, Boll discloses the methods of claims 15 and 17 wherein the second wear component has a value represented as a percentage of the storage capacity of the storage battery after a certain duration of time at a battery temperature(pg 16 ln 2-7 and pg 13 ln

1-14 and pg 24 ln 18-23), however, does not expressly disclose wherein the value is between

0.3% and 5%, or wherein the total duration of time is 100 hours, or wherein the battery

temperature is in the region of 20°C.

It has been held that discovering an optimum value of a result effective variable involves

only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

At the time of the invention, it would have been obvious to a person of ordinary skill in

the art to calculate a wear component with a value between 0.3% and 5% of the storage capacity

of the storage battery after a total duration of 100 hours at a battery temperature in the region of

20°C by routine experimentation, in order to find a value which provides maximum efficiency

and a longer life for the battery.

8.   Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boll

(DE 195 40 827 A1) in view of Plett (US 6,534,954).

With respect to claim 20, Boll discloses the method of claim 19, as noted above under the

rejection under 35 U.S.C. 102(b), wherein the first wear component is calculated from a first

function that behaves non-linearly with regard to the total number of deep discharge events (pg

15 ln 34 to pg 16 ln 8), however, does not expressly disclose wherein the behavior is linear.

Plett discloses a method to linearize functions by using an Extended Kalman filter in

order to obtain desired values for a battery (col 5 ln 40-45), so that the accuracy of the

measurements is increased (col 3 ln 9-14 and ln 22-24) and the system model is less complex and

easier to understand.

At the time of the invention, it would have been obvious to a person of ordinary skill in

the art to adjust the non-linear functions of Boll by using an Extended Kalman filter in order to

obtain linear functions, as do the functions of Plett, so that the accuracy of the measurements is increased and the system model is less complex and easier to understand.

With respect to claim 22, Boll discloses the method of claim 19, as noted above under the rejection under 35 U.S.C. 102(b), wherein the second wear component is calculated from a second function that behaves non-linearly with regard to the total duration of deep discharge events (pg 15 ln 34 to pg 16 ln 8), however, does not expressly disclose wherein the behavior is linear.

Plett discloses a method to linearize functions by using an Extended Kalman filter in order to obtain desired values for a battery (col 5 ln 40-45), so that the accuracy of the measurements is increased (col 3 ln 9-14 and ln 22-24) and the system model is less complex and easier to understand.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to adjust the non-linear functions of Boll by using an Extended Kalman filter in order to obtain linear functions, as do the functions of Plett, so that the accuracy of the measurements is increased and the system model is less complex and easier to understand.

9.   Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boll (DE 195 40 827 A1) in view of Koenck (US 4,553,081).

With respect to claim 25, Boll discloses a method comprising:

identifying a plurality of deep discharge events when a state of charge value for the storage battery is less than a minimum state of charge value specified for the storage battery (pg 3 ln 7-13 and pg 5 ln 5-9);

determining the duration of the plurality of deep discharge events (Fig. 3);

determining a wear variable which characterizes the wear as a function of the total

number and the total duration of the plurality of deep discharge events (pg 16 ln 3-5 and pg 14 ln

4-6 and ln 22-24);

wherein the wear variable increases as the total number and the total duration of the deep

discharge events increases (pg 16 ln 3-5).

Although Boll does not expressly disclose a computer program comprising a program

code means wherein the program code means are designed to carry out the method described

above, he does disclose a computer which would monitor the battery (pg 6 ln 16-24 and pg 20 ln

10-16). Therefore, it would be obvious to a person of ordinary skill in the art that the computer

of Boll would contain a computer program, so that the computer would have instructions on how

and when to carry out the measurements and perform the calculations for the wear on the battery.

Koenck discloses a program code means designed to carry out a method involving deep

discharge events (col 2 ln 10-20), in order to provide a means for automatically monitoring and

conditioning the batteries (col 2 ln 12-15), which would extend battery life.

At the time of the invention, it would have been obvious to a person of ordinary skill in

the art to include a computer program with the apparatus of Boll, in order to have a means for the

computer to interact with the batteries and so that the batteries could be automatically monitored

and conditioned, which would extend battery life.

Allowable Subject Matter

10.   Claims 4-6 are objected to as being dependent upon a rejected base claim, but would be

allowable if rewritten in independent form including all of the limitations of the base claim and

any intervening claims.

Claim 4 recites the method of claim 1 wherein only those deep discharge events whose

duration exceeds a defined minimum duration are assessed in order to determine the total

number.

Claim 5 recites the method of claim 4 wherein the defined minimum duration is defined

as a function of at least one of the ambient temperature and the battery temperature.

Claim 6 recites, inter alia, the method of claim 4.

The art of record does not disclose the above limitations, nor would it be obvious to

modify the art in such a manner.

Conclusion

11.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure. Anbuky (US 2005/0001627) discloses methods, an apparatus, and a computer

program for monitoring and testing a battery's life by using its state of health. Koenck (US

2002/0101218) discloses a battery conditioning system that monitors the battery characteristics

related to deep discharge cycles.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Aaron Piggush whose telephone number is 571-272-5978. The

examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Michael Sherry can be reached on 571-272-2084. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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